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[0001] The invention relates to the devices of concerning fuel tank of vehicle.

[0002] One knows according to document FR-2 746.855 a fuel tank with two pockets for automotive vehicle, comprising a tank and two bowls of reserve introduced into the tank through a respective upper opening of each pocket to extend at the bottom from the associated pocket. These bowls allow domestic fuel reserve being used as help when the tank is substantially empty. However, this tank has as a disadvantage which it requires to introduce into the tank and to position each bowl, which is relatively long. Moreover, for each bowl, the capacity of the bowl of reserve is limited by dimensions of the opening of the associated pocket allowing its introduction, like by the general configuration of the pocket. For example, it is not possible to introduce into the pocket a cylindrical bowl of reserve having an upper capacity with defined volume by the section of the opening multiplied by the height between this opening and the bottom of the pocket.

[0003] A purpose of the invention is to provide a device of reserve easy and quick install in a tank and having a substantial capacity compared to dimensions of the opening and the configuration of the tank for which it is intended.

[0004] For the realization of this purpose, one envisages according to the invention a device of concerning a fuel tank of vehicle, comprising at least two bowls of reserve, and the adapt means of connection to connect the two bowls one to other by a nonrigid connection.

[0005] Thus, to introduce the device into the tank, one can lay out the two bowls in a relative position one compared to the other different one of the final relative position planned for the two bowls in the tank. Especially, one can thus introduce the two bowls into the opening of a tank of tank which otherwise, because of its configuration and its low depth, would not allow the introduction of the two bowls into their relative position. It follows that one can lay out in the tank a device of reserve of large capacity compared to dimensions of the opening and the configuration of the tank. Moreover, owing to the fact that the two bowls remain connected one to other during this introduction, one keeps a good control of the two bowls and the operation of introduction is single to carry out.

[0006] Preferably, the means of connection are adapt to connect the two bowls by an articulation.

[0007] Preferably, the means of connection comprise at least an adapt flexible portion to connect the two bowls.

[0008] One constitutes thus the articulation of way particularly single.

[0009] Preferably, the means of connection are of only one part with one of the bowls and are adapt with being attached with the other bowl.

[0010] Preferably, the means of connection are adapt with being attached with the other bowl by click-and-ratchet work.

[0011] Preferably, the means of connection are adapt to connect bases of each bowl one to the other one.

[0012] This configuration simplifies the operation of the bowls during their introduction.

[0013] Preferably, one of the bowls present a larger section following planar transverse parallel with a basis of the bowl, of the same general form as a larger section of the other transverse planar following bowl perpendicular with a basis of the other bowl and parallel to an axis of the articulation.

[0014] Thus, the device of present reserve a capacity particularly substantial compared to dimensions of the opening of a just upper tank to those of this section.

[0015] Preferably, one of the bowls has a shaped general form following a perpendicular direction with a basis of the bowl, the other bowl having a shaped general form following a direction, perpendicular with a basis of the other bowl and parallel to an axis of the articulation.

[0016] Thus, one optimizes the capacity of the device of reserve.

[0017] Preferably, the device comprises means of rigidification to rigidly connect the two bowls one to the other one.

[0018] Thus, one improves the stability of the device of reserve once this one introduced into a tank.

[0019] Preferably, the means of rigidification are adapt to cooperate with the means of connection to connect the two bowls rigidly.

[0020] Preferably, the means of rigidification include/understand means of click-and-ratchet work.

[0021] One obtains rigidification thus in the single and quick way.

[0022] Preferably, the device comprises an adapt conduit to ensure a fuel communication directly of the one other of the bowls.

[0023] Preferably, the device comprises a valve non-return valve arranged to allow a fuel supply of a first of the bowls by means of the conduit starting from a second of the bowls, by prohibiting a fuel supply of the second bowl by means of the conduit starting from the first bowl.

[0024] Preferably, the conduit connects the lowest zone of the one of the bowls to the lowest zone of the other bowl.

[0025] Preferably, the device is arranged to allow a transfer of fuel from one of the bowls directly to the other bowl, over edges of the two bowls.

[0026] Thus, one of the bowls is adapt to feed the other one by overflow.

[0027] Preferably, at least one among the two bowls comprises a cover sealing partially an upper zone of the bowl.

[0028] Preferably, the device comprises at least a filter arranged to allow a fuel supply of the one of the woods starting from the tank

through the filter.

[0029] Preferably, each filter extends under one respective from the bowls.

[0030] Preferably, the filter is adapt to extend below the other bowl.

[0031] One thus improves the obstruction of the device of reserve.

[0032] One also envisages according to the invention a fuel tank for vehicle, comprising a tank and a device according to the invention.

[0033] Preferably, the present tank an opening allowing to introduce into the tank the bowls of the device, the opening having dimensions just sufficient for the introduction of the one of the bowls.

[0034] Thus, the capacity of this bowl is optimized compared to dimensions of the opening.

[0035] Other characteristics and advantages of the invention will still appear in the following description of two modes preferred of realization given as nonrestrictive examples. With the annexed drawings:

figure 1 is a vertical transverse cross-section following planar II of the other figures of a device of reserve according to a first embodiment of the invention;
figure 2 is a sight partial out of vertical cut following the planar II-II of the other figures of the device of reserve of figure 1;
figure 3 is a vertical cross-section following the planar III-III of the other figures, device of reserve of figure 1;
figure 4 and figure 5 are two horizontal cross-sections following the planar IV-IV and V-V respectively of the other figures, of the device of reserve of figure 1;
figures 6 to 9 are vertical cross-sections following the planar VI-VI, VII-VII, VIII-VIII and IX-IX respectively of the other figures, device of reserve of figure 1;
figures 10 and 11 are two sights similar on figure 1 showing two situations of acceleration during the use of the device of reserve;
figures 12 to 17 show successive steps of the introduction of the device of reserve of figure 1 into a tank;
figure 18 is a diagram showing the circulation of fluid in the device of reserve of figure 1;
figures 19 to 21 are vertical cross-sections following the planar XIX-XIX, XX-XX and XXI-XXI of figure 21 of a device of reserve according to a second embodiment of the invention; and
figure 22 is an horizontal cross-section of principle of the device of reserve of figure 19.

[0036] In reference on figures 1 to 9, in a first embodiment, the device of reserve according to the invention comprises a first bowl 2, here main bowl, and a second bowl 4, here auxiliary bowl. Each of the two bowls is out of plastic of only one taking. Each bowl 2, 4 A a cylindrical shaped general form with circular right transverse section. The main bowl 2 and the auxiliary bowl 4 have each one a basis 6, 8 presenting feet enabling them to rest on a planar face of an automotive fuel tank of vehicle. Basis 6 of the main bowl 2 extends at an axial end from the cylinder in planar general perpendicular with a longitudinal axis 10 from the cylinder. Basis 8 of the auxiliary bowl 4 extends along a generator from the cylinder in planar general parallel with a longitudinal axis 12 from the cylinder. Thus, the main bowl 2 is adapt to rest with the cylinder "upright" on basis 6, and the auxiliary bowl 4 is adapt to rest with the "coated" cylinder on basis 8. The main bowl 2 present an upper free edge 14 defining an open upper axial end main bowl 2 opposed to its basis 6. The two cylinders have same diameters substantially. The auxiliary bowl 4 comprises a cover 16, of planar form and parallel to extending basis 8 by sparing only one small port 18 partly upper from the auxiliary bowl 4.

[0037] In reference on figures 7 to 9, the auxiliary bowl 4 comprises two legs 20, 22 each one of planar lengthened general form extending starting from an axial end from the bowl, parallel to axis 12 in direction opposed to the bowl. Leg 20 has a rigorously planar form. The leg 22 has a form bent in "L" and extends axis 12 parallel to, then perpendicularly with this one, in direction of this axis. Each leg 20, a 22 present pin at its free end. The two legs extend on both sides from planar longitudinal median auxiliary bowl 4 perpendicular with its basis 8.

[0038] The main bowl 2 comprises two residences 24, 26 adapt to receive legs 20, 22 respective to produce a click-and-ratchet work prohibiting the withdrawal of the legs, once those inserted in the residences. These two residences 24, 26 extend in the vicinity of basis 6 from the main bowl 2. Each housing is defined between a strip of the main bowl 2 and the wall of the bowl in glance.

[0039] The legs 20, 22 and residences 24, 26 are laid out so that, when the legs and the residences are retained, the main bowl 2 and the auxiliary bowl 4 can rest by means of their bases 6, 8 on a common planar support, with axis 10 of the main bowl 2 perpendicular with axis 12 of the auxiliary bowl 4, the two axes being intersecting, and this without legs 20, 22 not being requested. An axial end of the auxiliary bowl 4 extends then in glance and in the vicinity of a wall from the main bowl 2, parallel to a generator of this wall. Legs 20, 22 are configured to at least once be able to be bent during the lifespan of the device of reserve on a maximum angle lain for example between 60 and 90 DEG. Two legs 20, 22 constitute adapt mechanical means of connection to connect two bowls 2, 4 one with other by defining between them a flexible nonrigid connection which is here an articulation around a perpendicular axis 30 with the planar defined commun run by axes 10, 12 of the woods once those connected. The two legs define this axis 30 so that it is adjacent with bases 6, 8 of the bowls.

[0040] The main bowl 2 comprises a pin 32 extending to its upper edge 14 on an outer face from its wall, projecting of this one. The pin is directed towards basis 6 of this main bowl 2 and is on the generator of this bowl 2 intended to be nearest of the auxiliary bowl the 4 once woods connected by legs 20, 22. This pin 32 is formed to come into taken by click-and-ratchet work with an upper edge 34 from the auxiliary bowl 4 when the two woods extend in the aforementioned position where the legs connect the bowls without being solicited. Pin 32 present conventionally an adapt outer face inclined to facilitate the arrival of edge 34 of the auxiliary bowl 4 into taken with the pin. Pin 32 and edge 34 constitute means of rigidification of the device of reserve cooperating with legs 20, 22 so that two bowls 2, 4 are then rigidly immobilized one compared to the other one.

[0041] The device of reserve is adapt to make portion of a fuel tank for automotive vehicle comprising a tank 36, the two woods extending in a same pocket from the tank. This tank, of a conventional type, present here an upper opening 38 with circular section of the same form than the right section of the main bowl 2 and auxiliary bowl 4 perpendicularly with their axes 10, 12 respective. The section of opening 38 has just sufficient dimensions to allow the successive passage of two bowls 2, 4 with their parallel axe with an axis of the opening.

[0042] In reference on figures 12 to 17, to assemble the device of reserve, one fixed the two legs 20, 22 of the auxiliary bowl 4 on the main bowl 2 by retaining them in residences 24, 26. Then, one introduces into opening 38 the auxiliary bowl 4 by an axial end of this bowl remote of the main bowl 2, axis 12 being parallel with the axis of the opening. Starting from a certain stage, this introduction requires to bend the two legs 20, 22 as one sees it on figures 12 and 13. After the auxiliary bowl 4 fully entered tank 36, it comes in contact by its axial end with bottom 39 from the tank. One then makes penetrate in opening 38 an axial end of the main bowl 2 near of the auxiliary bowl 4, as on figure 14. That requires to accentuate the inflection of the legs 20, 22 and to off-set the auxiliary bowl 4 already introduced towards a side of tank 36.

[0043] In reference on figures 15 to 16, one continues the introduction of the main bowl 2. During this one, the auxiliary bowl 4 swivels around axis 30 of the articulation in direction of the main bowl 2. Gradually, the basis of the auxiliary bowl 4 becomes parallel at bottom 39 of the tank then in contact with this one. The inflection on legs 20, 22 reduced until becoming almost null when, in reference on

figure 17, two bases 6, 8 of the woods rest almost on bottom 39. One can then force the main bowl 2 in direction bottom it 39 to put two bases 6, 8 in contact with bottom 39 and thus to retain pin 32 on edge 34 in order to rigidify the device of reserve.

[0044] Preferably, pin 32 will be smallest possible not to obstruct the introduction of the main bowl 2 into the tank. Alternatively, not to obstruct the introduction of the device of reserve into the tank, one will be able to lay out pin 32 on the auxiliary bowl 4 so that it comes into taken with an edge from the main bowl 2.

[0045] The device of reserve is adapt to receive a fuel 40 pump of a conventional type partly extending in the main bowl 2, adapt to pump fuel contained in the main bowl 2, to even reject into this bowl of the fuel not consumed by the engine. The operations described in reference on figures 12 to 17 can be carried out with pump 40 already at least partly laid out in the main bowl 2.

[0046] In reference especially to figures 4 and 5, each bowl 2, 4 present a bottom 42, 44 with several levels, presenting the single zone 46, 48 nearest of the basis, i.e. lowest. Each bottom is formed to allow the flow of the fuel in the bowl by gravity in direction of this zone 46, 48 lowest. Two zones 46, 48 extend to one same height in position not requested from legs 20, 22. Each bowl 2, 4 present a tubular mouth 50, 52 of only one taking with the bowl and communicating towards outer bowl with this lowest zone, the axis of the mouth being to the same height that zone 46, 48 associated. Two mouths 50, 52 have each one the shape in "L" and are generally symmetrical one of other compared to hinge axis 30. Thus, these mouths have mutually coaxial sections extending in direction one from other and the parallel sections between them. Preferably, two mouths 50, 52 extend lowest possible and more close possible one of the other one. The device comprises a flexible flexible conduit 54 connected to two mouths 50, 52 and putting those in communication of fluid. Conduit 54 present a bent median section in a circular arc extending on three-quarter from turn. Its axis extends while being parallel to bases 6, 8 of the bowls in position not requested of the legs. Axis 30 of the articulation is used as axis of symmetry with conduit 54. This provision of conduit 54 enables him not to obstruct the operations of introduction of the device of reserve into the tank. In particular, conduit 54 is bent then around axis 30.

[0047] The device comprises a valve non-return valve 55, schematically accounted for on figures 1, 10 and 11, associated conduit 54 with the level of mouth 50 of the main bowl 2. This valve 55 is arranged so that the main bowl 2 can be supplied with fuel starting from the auxiliary bowl 4 via conduit 54, like indicated by arrow 56 on figure 1, but not the reverse one. In other words, one prohibits the power supply of the auxiliary bowl 4 by the main bowl 2 via conduit 54. This power supply of the main bowl 2 by the auxiliary bowl 4 is done automatically when the fuel level in the main bowl 2 becomes low with that in the auxiliary bowl 4.

[0048] Upper opening 18 of the auxiliary bowl 4 extends in the vicinity of the main bowl 2. It is contiguous at edge 34 cooperating with pin 32. Moreover, the edge 14 of the main bowl 2 A its lowest zone 56 extending above pin 34. This provision allows the power supply of the auxiliary bowl 4 starting from the main bowl 2 by overflow of this one, over zone 56 and through opening 18 like indicated by arrow 60 of figure 1, for example because of the movements of the vehicle.

[0049] The main bowl 2 overflows permanently as long as there is gasoline in the tank around the device of reserve. There are thus a permanent transfer of fuel of the main bowl 2 to the auxiliary bowl 4 through opening 18, and a permanent fuel circulation of the auxiliary bowl 4 towards the main bowl 2 through valve 55. A self-cleaning of the valve thus is ensured.

[0050] The device comprises, in a way not represented in detail and known in oneself, a member of filling 69 of the main bowl 2 out of fuel. The device comprises moreover a strainer forming filter 61 clipsée under the bottom of the main bowl 2 and in communication of fluid with this member 69 according to arrow 71 of figure 1 and with the fuel tank according to arrow 63. This member 69 can be the first stage of a double pump stage, a jet pump, or analogue. The member of filling 69 supplies the main bowl 2 out of fuel starting from the tank through strainer 61.

[0051] In reference on figure 5, the main bowl 2 comprises possibly a conduit 64 communicating with strainer 61 and provided at an end with a filter 66, being used here as filter of extension. Filter 66 extends under the auxiliary bowl 4. Filter 66 makes it possible to increase the surface of filtering and to collect the gasoline in other zones of the tank far away from the main bowl 2. However, the communication between the main bowl 2 and the tank could alternatively be done via this single filter 66. The diagram of figure 18 illustrates this circulation of the fuel.

[0052] Figure 10 watch different situations of the fuel level in woods 2, 4 when tank 36 undergoes, because of the movement of the vehicle, a parallel acceleration with axis 12 of the bowl auxiliary 4 and directed main bowl 2 towards the auxiliary bowl 4, like indicated by arrow 63. For example, it is about an acceleration towards the left one if the main bowl 2 is laid out on the left of the auxiliary bowl 4 in the vehicle. One considers here that the fuel 36 tank is then almost fully empty, the device of reserve containing the single fuel remainder. The level of the fuel is directed then according to this acceleration and of gravity.

[0053] While overflowing of the main bowl 2, especially towards the auxiliary bowl 4, the fuel passes in the main bowl 2 of level 70 to the level 72 which geometrically cuts upper edge 56 of the main bowl. The fuel in the main bowl is then operable by pump 40 as long as its level 74 is between levels 72 and 76, this last being adjacent valve non-return valve 55. The auxiliary bowl 4 can supply the main bowl 2 by conduit 54 as long as the level in the auxiliary bowl 4 does not reach the level 78 where it passes below the valve.

[0054] In reference on figure 11, the acceleration is this time directed in reverse direction, towards the right one, like the watch arrow 65. The auxiliary bowl 4 overflows, especially towards the main bowl 2, until reaching level 80 geometrically passer by by upper edge 56. The remaining portion of fuel can then fully pass in the main bowl 2 via conduit 54. In the main bowl 2, the fuel overflows towards the left one until reaching level 84 geometrically passer by by the upper edge 14 of the main bowl 2. Almost the whole of the contents of the main bowl 2 can then be pumped.

[0055] It is thus seen that, in each case, pump 40 can be supplied by almost the whole of the main bowl 2 and one substantial portion of the auxiliary bowl 4. The quantity of fuel effectively operable by the pump can further be increased by providing the main bowl 2d' a cover, for example open on the right one in direction of the auxiliary bowl 4 to continue to allow the aforementioned overflow.

[0056] One will be able to envisage to mount the main bowl 2 single, without the auxiliary bowl 4. With this fine, one will seal mouth 50 associated with conduit 54.

[0057] Figures 19 to 22 show a second embodiment of the device of the invention.

[0058] This time, the legs 20, 22 is identical between them. They are laid out on both sides of planar longitudinal a median commun run of the bowls passing by their axes 10, 12. Conduit 54 has a form in "S", mouths 50, 52 of the bowls associated with this communicating conduit with a central zone with bottom 42, 44 of each bowl. Defined hinge axis 30 by legs 20, 22 master key by a central section of conduit 54 in "S".

[0059] Of course, one will be able to bring to the invention many changes without leaving the frame of this one.

[0060] The connection between bowls 2, 4 will be able to include/understand a relative sliding motion of the bowls.